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EXAMINER	
PEREZ DAPLE, AARON C	

ART UNIT	PAPER NUMBER
2121	7

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/817,534	Applicant(s) ATKINSON, LEE W.	
	Examiner Aaron Perez-Daple	Art Unit 2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *46-90* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *46-90* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This Action is in response to Amendment filed 3/8/04, which has been fully considered.

2. Claims 1-45 have been cancelled by Applicant.

3. New claims 46-90 are presented for examination.

4. This Action is made Final.

Claim Objections

5. **Claim 77** objected to because of the following informalities: line 6 recites "the at least sensor" where it should recite --the at least one sensor--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

> Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A claim in dependent form shall be construed to incorporate by reference all of the limitations of the claim to which it refers.

7. **Claims 64 and 80** are rejected under 35 U.S.C. 112, fourth paragraph, as exceeding the subject matter of the previous claim set forth to which it refers.

8. With respect to claim 64, the parent claim 63 recites sensing a *non-temperature* parameter. Claim 64 recites that the parameter indicates temperature, which requires that "the parameter" of claim 63 is in fact a temperature parameter. Therefore, claim 64 does not include all the limitations of claim 63 from which it depends. See MPEP § 2173.05(p).

9. With respect to claim 80, the parent claim 77 recites a sensor for obtaining a *non-temperature* operating parameter. Claim 80 recites that the at least one sensor comprises a temperature sensor, which inherently requires that "the sensor" sense a temperature operating

parameter. Therefore, claim 80 does not include all the limitations of claim 77 from which it depends. See MPEP § 2173.05(p).

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

11. **Claims 63-64, 66, 67, 77-80 and 82-87, 89 and 90** are rejected under 35 U.S.C. 102(e) as being anticipated by Bausch et al. (US 6,304,824 B1) (hereinafter Bausch).

12. As for claims 63 , 77 and 86, Bausch discloses a method and system comprising:

an integrated circuit (integrated circuit 10, Fig. 3);

a power supply coupled to the integrated circuit (power supply 40, Fig. 3; col. 7, line 59-col. 8, line 9, "Fig. 6C illustrates...circuit 32 implemented.");

at least one sensor configured to obtain an indicator of at least one non-temperature operating parameter of the integrated circuit (channel mobility sensor 20, Fig. 3); and

a controller coupled to the at least sensor and the power supply, wherein the controller is configured to analyze the operational relationship between the at least one non-temperature operating parameter, an operating voltage, and an operating frequency to provide the power supply with a target voltage that substantially minimizes power consumption and that simultaneously maintains a substantially constant operating frequency of the integrated

circuit (col. 4, lines 59-67, "The exemplary low power...region of operation."; The "code" of claim 86 is considered inherent to the DSP and microcontroller of col. 7, lines 54-58, "This digital output...to the IC 11.").

13. As for claim 64, Bausch discloses the method of claim 63, wherein sensing the at least one parameter comprises obtaining an indicator of at least one of existing operating temperature, existing operating load, existing operating voltage, and existing operating frequency (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

14. As for claim 66, Bausch discloses the method of claim 63, wherein analyzing the operational relationship comprises solving an equation characterizing power consumption, voltage, and frequency of the integrated circuit (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

15. As for claim 67, Bausch discloses the method of claim 63, comprising adjusting the power supply to provide the target voltage to the integrated circuit (col. 3, lines 40-42, "Therefore, to keep...adjusted to compensate.").

16. As for claim 78, Bausch discloses the method of claim 77, wherein the integrated circuit comprises a processor (microprocessor 10B, Fig. 4).

17. As for claim 79, Bausch discloses the method of claim 77, comprising a computer system (Fig. 4).

18. As for claim 80, Bausch discloses the method of claim 77, wherein the at least one sensor comprises a temperature sensor configured to obtain an indicator of operating temperature of the integrated circuit (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

19. As for claim 82, Bausch discloses the method of claim 77, wherein the controller comprises a programmable logic unit (col. 7, lines 54-58, "This digital output...to the IC 11.").

20. As for claim 83, Bausch discloses the method of claim 77, wherein the controller comprises code stored on a tangible medium (considered inherent to digital signal processor 332, Fig. 6B; col. 7, lines 54-58, "This digital output...to the IC 11.")

21. As for claim 85, Bausch discloses the method of claim 77, wherein the controller comprises a characteristic equation of the integrated circuit that can be solved to obtain the target voltage (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

22. As for claim 87, Bausch discloses the method of claim 86, wherein the code is configured to evaluate a plurality of sensed operating parameters for the integrated circuit, including the non-temperature operating parameter and an operating temperature of the integrated circuit (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

23. As for claim 89, Bausch discloses the method of claim 86, wherein the code is configured to solve an equation characterizing power consumption, voltage, and frequency of the integrated circuit to obtain the target voltage (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

24. As for claim 90, Bausch discloses the method of claim 86, wherein the code is disposed on a computer system (Figs. 4 and 5).

Claim Rejections - 35 USC § 103

25. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

26. **Claims 46-50, 52-59, 61, 62, 68-76 and 81** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausch et al. (US 6,304,824 B1) (hereinafter Bausch) in view of Alexander et al. (US 5,420,808) (hereinafter Alexander).

As for claims 46 and 48, Bausch explicitly discloses obtaining a plurality of operating parameters including operating temperature of an integrated circuit (See col. 3, lines 40-50, "Therefore, to keep the...operating temperature range," col. 4, lines 59-67, "The exemplary low power...region of operation," and col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.");

analyzing the plurality of operating parameters to provide a target voltage that substantially minimizes power consumption and that simultaneously maintains a substantially constant operating frequency (col. 4, lines 59-67, "The exemplary low power...region of operation."); and

adjusting a power supply coupled to the integrated circuit from an existing voltage to the target voltage (col. 3, lines 47-51, "The monitored parameter...operating temperature range.").

Although obvious to one of ordinary skill in the art and arguably inherent to the Bausch reference during the step of minimizing power consumption, Bausch does not explicitly disclose obtaining the operating load of an integrated circuit by detecting a power load variation of the integrated circuit. Alexander discloses obtaining the operating load of an integrated circuit by detecting a power load variation of the integrated circuit for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line 8, "In the exemplary embodiment...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by obtaining the operating load of the integrated circuit by detecting a power load variation of the integrated circuit in order to switch to a low power mode, as taught by Alexander.

27. As for claim 47, Bausch discloses the method of claim 46 wherein obtaining the plurality of operating parameters comprises sensing at least one of operating temperature, operating load, operating voltage, operating frequency, and resistance of the integrated circuit (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

28. As for claim 49, Bausch discloses the method of claim 46, wherein obtaining the plurality of operating parameters comprises detecting an operating temperature variation of the integrated circuit (col. 7, lines 14-17, "Fig. 6A illustrates...in control circuit 30.").

29. As for claim 50, Bausch discloses the method of claim 46, wherein obtaining the plurality of operating parameters comprises sensing at least one operating parameter of a processor (col. 3, lines 40-50, "Therefore, to keep the...operating temperature range.").

30. As for claim 52, Bausch discloses the method of claim 46, wherein analyzing the plurality of operating parameters comprises solving an equation characteristic of the

integrated circuit to obtain the target voltage based on at least one of the plurality of operating parameters (col. 3, lines 29-50, "Thus, the individual...operating temperature range."; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

31. As for claim 53, Bausch discloses the method of claim 52, wherein analyzing the plurality of operating parameters comprises calculating the target voltage from the equation having an inverse relationship between operating temperature and operating frequency and having a direct relationship between operating voltage and operating frequency (The relationship between the variables is inherent to the physics of the device, as further described by Bausch in cols. 3-4.; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

32. As for claim 54, Bausch discloses the method of claim 46, wherein adjusting the power supply comprises providing a control signal configured to adjust the power supply to the target voltage (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

33. As for claim 55, Bausch discloses the method of claim 46, comprising programming a programmable power supply (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

34. As for claims 56, 68 and 70 Bausch discloses a method for controlling operational parameters of a computer system comprising:

sensing an operating temperature of an integrated circuit coupled to a power supply (col. 7, lines 14-17, "Fig. 6A illustrates...control circuit 30."; Fig. 3);

analyzing an operational relationship between the operating temperature, operating parameters, an operating voltage, and an operating frequency to provide a target voltage that

substantially reduces power consumption without substantially altering operating frequency of the integrated circuit (col. 4, lines 59-67, "The exemplary low power...region of operation.").

Although obvious to one of ordinary skill in the art and arguably inherent to Bausch, Bausch does not explicitly disclose detecting another operating parameter of the integrated circuit. Alexander discloses detecting another parameter of the integrated circuit for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line8, "In the exemplary...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by detecting another parameter indicative of existing operating load of the integrated circuit for the purpose of switching to a low power mode, as taught by Alexander.

35. As for claims 57 and 81, although obvious to one of ordinary skill in the art and arguably inherent to Bausch, Bausch does not explicitly disclose detecting another operating parameter of the integrated circuit wherein the operating parameter comprises an indicator of existing operating load. Alexander discloses detecting an operating parameter of an integrated circuit wherein the operating parameter comprises an indicator of existing operating load for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line8, "In the exemplary...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by detecting another parameter indicative of existing operating load of the integrated circuit for the purpose of switching to a low power mode, as taught by Alexander.

36. As for claim 58 and 81, Bausch discloses the method of claim 56, wherein detecting the operating parameter comprises obtaining an indicator of existing operating voltage (Since the voltage is commanded by the control system of Bausch, the system inherently includes an indicator of the voltage. See Fig. 3.).

37. As for claim 59 and 81, although obvious to one of ordinary skill in the art and arguably inherent to Bausch, Bausch does not explicitly disclose detecting another operating parameter of the integrated circuit wherein the operating parameter comprises an indicator of existing operating frequency. Alexander discloses detecting an operating parameter of an integrated circuit wherein the operating parameter comprises an indicator of existing operating frequency for the purpose of switching to a low power mode (col. 2, line 64 - col. 3, line8, "In the exemplary...at the same time."). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Bausch by detecting another parameter indicative of existing operating frequency of the integrated circuit for the purpose of switching to a low power mode, as taught by Alexander.

38. As for claim 61, Bausch discloses the method of claim 56, wherein analyzing the operational relationship comprises solving an equation having an inverse relationship between the operating temperature and operating frequency and having a direct relationship between operating voltage and operating frequency (The relationship between the variables is inherent to the physics of the device, as further described by Bausch in cols. 3-4.; col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

39. As for claim 62, Bausch discloses the method of claim 56, comprising providing feedback to the power supply to adjust output of the power supply to provide the target

voltage to the integrated circuit (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly.").

40. As for claim 69, Bausch discloses the method of claim 68, wherein providing the control system comprises providing a power supply controller configured to adjust a power supply coupled to the integrated circuit from an existing voltage to the target voltage (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly."; Fig. 3).

41. As for claim 71, Bausch discloses the method of claim 68, comprising providing a logic unit configured to determine the target voltage (control circuit 30, Fig. 3).

42. As for claim 72, Bausch discloses the method of claim 68, comprising providing code configured to determine the target voltage (considered inherent to DSP or microprocessor, col. 7, lines 54-58, "This digital output...to the IC 11.").

43. As for claim 74, Bausch discloses the method of claim 68, comprising providing a programmable power supply responsive to the control circuit (col. 5, line 58 - col. 6, line 4, "Fig. 3 is a...supply 40 accordingly."; Fig. 3).

44. As for claim 75, Bausch discloses the method of claim 68, comprising providing an integrated circuit having the control system (integrated circuit 10, Fig. 3).

45. As for claim 76, Bausch discloses the method of claim 68, comprising providing a computer having the integrated circuit (Figs. 4 and 5).

46. **Claims 51, 60 and 73** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausch in view of Alexander and in further view of Ginzel et al. (US 5,347,260) (hereinafter Ginzel). As for claims 51 and 60, Bausch discloses analyzing the plurality of operating parameters to set a target voltage (col. 4, lines 59-67, "The exemplary low power...region of

operation."). However, Bausch does not specifically disclose accessing a look-up table. It is well-known and expected in the controller arts to access a look-up table for the purpose of reducing processing requirements and achieving faster system response time. Ginzel teaches a control system having a sensor which uses a look-up table to store values in place of an equation for the purpose of reducing processing requirements (col. 36-38, "Alternatively, a look-up table...the equation."). It would have been obvious to one of ordinary skill in the art to modify the teachings of Bausch and Alexander by accessing a look-up table having voltages corresponding to at least one of a plurality of operating parameters because this would prevent the need to use an equation and reduce processing requirements, as taught by Ginzel. See also cited reference US 6,476,716 B1.

47. **Claims 65, 84 and 88** are rejected under 35 U.S.C. 103(a) as being unpatentable over Bausch in view of Ginzel. As for claims 65, 84 and 88, Bausch discloses analyzing the plurality of operating parameters to set a target voltage (col. 4, lines 59-67, "The exemplary low power...region of operation."). However, Bausch does not specifically disclose accessing a look-up table. It is well-known and expected in the art to access a look-up table for the purpose of reducing processing requirements and achieving faster system response time. Ginzel teaches a control system having a sensor which uses a look-up table to store values in place of an equation for the purpose of reducing processing requirements (col. 36-38, "Alternatively, a look-up table...the equation."). It would have been obvious to one of ordinary skill in the art to modify the teachings of Bausch and Alexander by accessing a look-up table having voltages corresponding to at least one of a plurality of operating

parameters because this would prevent the need to use an equation and reduce processing requirements, as taught by Ginzel. See also cited reference US 6,476,716 B1.

Response to Arguments

48. Claims 1-45 have been cancelled by Applicant, therefore arguments with respect to these claims are moot.

49. Applicant makes the same primary argument with respect to each of the independent claims 46, 56, 63, 68, 77 and 86. Specifically, Applicant asserts that Bausch fails to teach substantially minimizing power consumption while simultaneously maintaining a substantially constant operating frequency. The dependent claims are asserted to be allowable based on the patentability of the independent claims. The Examiner respectfully disagrees with Applicant's assertion.

First, Applicant is reminded that basic laws of physics govern the relationship between the claimed variables of voltage, power consumption, temperature and operating frequency. These relationships can be described briefly as follows: as temperature increases, operating frequency decreases; as voltage increases, operating frequency increases and power consumption increases. Thus, as is well-known in the art, as temperature rises, one can increase voltage in order to offset any decrease in the operating frequency (see col. 3, lines 40-43, "Therefore, to keep...adjusted to compensate). In an IC chip, operating frequency is directly related to the channel currents (e.g. channel mobility), meaning that maintaining a substantially constant channel current is the same as maintaining a substantially constant operating frequency. Furthermore, minimizing power is achieved by minimizing the

operating voltage. These relationships are described in columns 3 and 4 of Bausch. See US 6,235,560 B1, col. 1, and US 3,793,721 for a further explanation of the relationship between operating frequency and channel mobility (e.g. channel currents) in integrated circuits.

Bausch specifically discloses methods for substantially minimizing power consumption while maintaining a substantially constant operating frequency. Line 250 of Fig. 2 is one clear example of this. As described by Bausch,

> The exemplary low power voltage track 250 illustrates regulating the supply voltage to keep the power consumed by the IC substantially to a minimum while operating within the characterized region of operation 200. This is done by setting the voltage to the IC at V.sub.in at T.sub.max and lowering the voltage to the IC as the temperature drops. This action keeps the individual channels currents at substantially a fixed level, thus keeping the IC within the characterized region of operation.

Given the relationships described above, Bausch clearly anticipates the claimed limitation of providing a target voltage that substantially minimizes power consumption and that simultaneously maintains a substantially constant operating frequency (e.g. channel currents). Moreover, Bausch makes it clear that different operating regions of Fig. 2 may be selected if the goal is to maximize operating frequency. Similarly, line 250 could simply be raised to minimize the power consumption at a higher substantially constant operating frequency.

Additional limitations of the claims are taught by Bausch, as detailed in the rejection above. Therefore, claims 46-90 are properly rejected under 35 USC 102(e) as unpatentable over Bausch.

Conclusion

50. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 3,793,721, note discussion of channel mobility as related to frequency; US

5,063,527, note PLC with look-up table; US 5,444,612, note exemplary DSP; US 5,867,383, note teaches PLC; US 6,233,532 B1, note PLC with look-up table; US 6,235,560 B1, note discussion of channel mobility as related to frequency; US 6,476,716 B1, note use of look-up table in controlling system response.

51. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

52. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Perez-Daple whose telephone number is 703-305-4897. The examiner can normally be reached on 9am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 703-308-3179. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

4/22/04

Aaron Perez-Daple

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